

Stubble height effects on canola performance in different climate regions

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Presentation Layout

- Introduction of stubble management
- Project Layout and Design
- Results
 - Emergence
 - Microclimate
 - Canola performance
- Overall Summary

Previous Research

- Cutforth and McConkey (1997, Can J Plant Sci 77, 359) and Cutforth et al (2006, Can J Plant Sci 86, 99) showed that tall cereal stubble (in comparison to short stubble) altered the microclimate and increased yield and water use efficiency in canola and pulse sown the following year.
- Is this benefit consistent and does it occur in locations other than the Swift Current region?

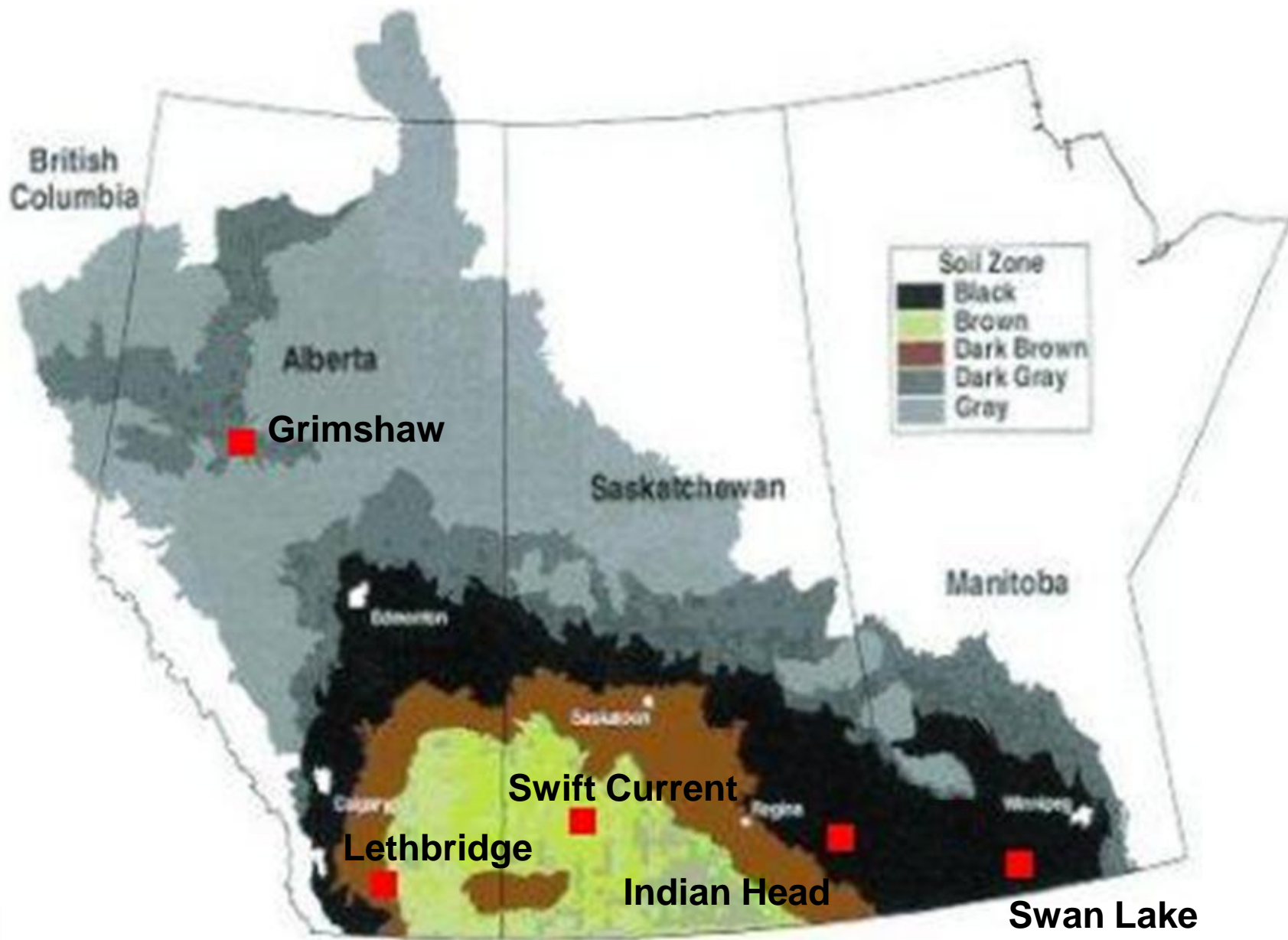


Project Objectives

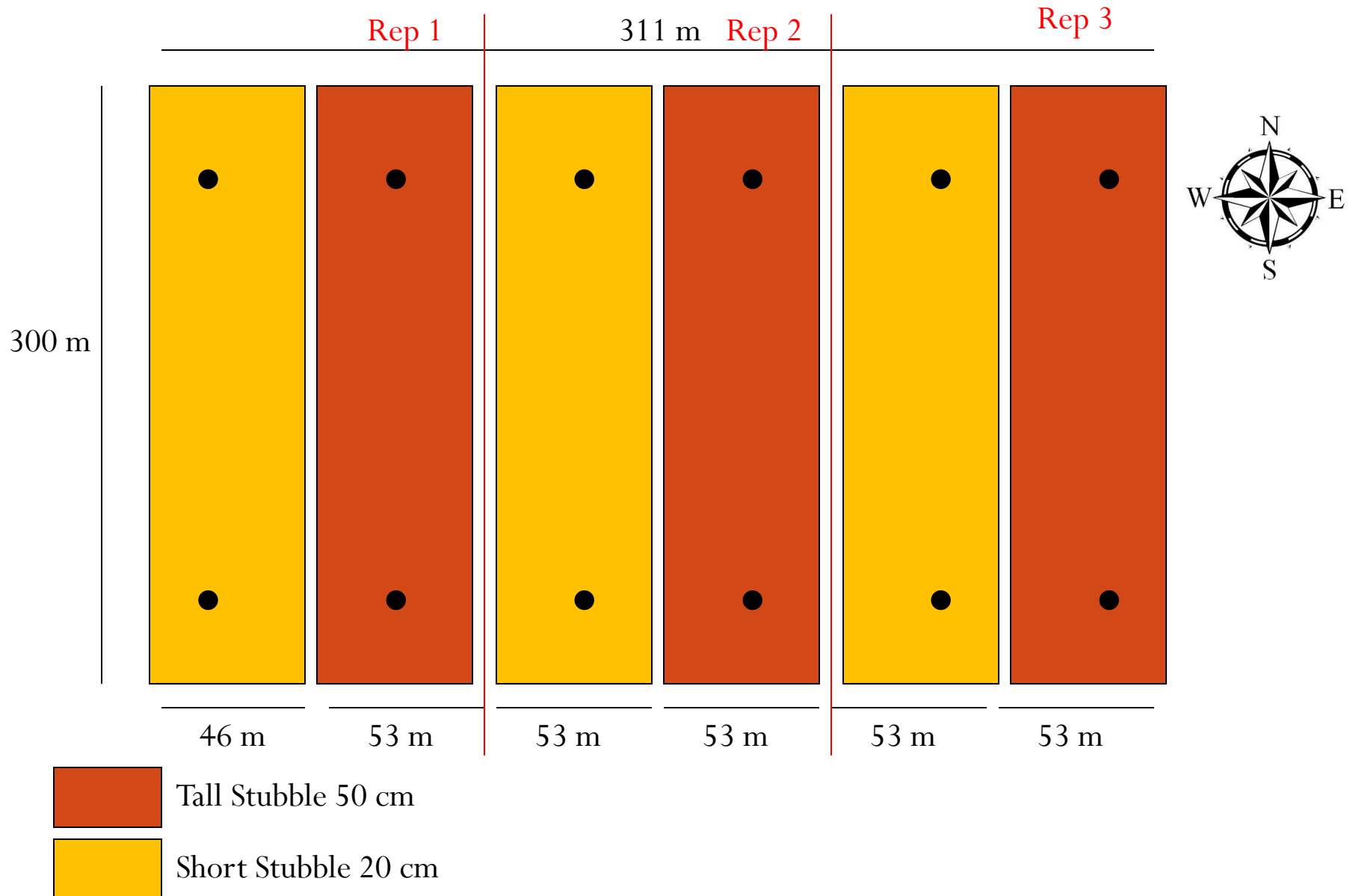
- Evaluate the performance of canola seeded into tall (50 cm) versus short (20 cm) cereal stubble
- Determine the effects of tall versus short stubble on the microclimate the following spring.
- Determine whether this mechanical approach can benefit canola performance in an inexpensive way and without additions of pesticides and fertilizers.

Project Layout

- In 2011, cereal fields at both AAFC research stations and producer fields were harvested to leave tall stubble at 5 different locations across western Canada
- The tall stubble was sculpted to create a comparison of a 50 cm tall cut versus a 20 cm short cut (some sites also had a stripper header treatment).
- Some sites were sculpted in the fall, prior to winter and some were sculpted in the spring.
- All sites were arranged in a Randomized Complete Block Design with 3 or 4 replications
- The plots were large (typically 40 x 100 m) to create representative microclimates in each.



Indian Head Site Layout



Intact Stubble vs. Damaged Stubble



Methodology -Emergence Counts

- Emergence counts were taken around the 2 to 4 leaf stage of canola development.
- At 24 random locations across each plot, the number of plants along a 1-meter length of row were counted
- Using 1000 kernel weight of the canola seed, row spacing and seeding rate, calculated number of seeds planted per meter of row.
- $\% \text{ Emergence} = \frac{\# \text{ of plants emerged}}{\# \text{ of plants seeded}}$



Methodology - Microclimate Measurements

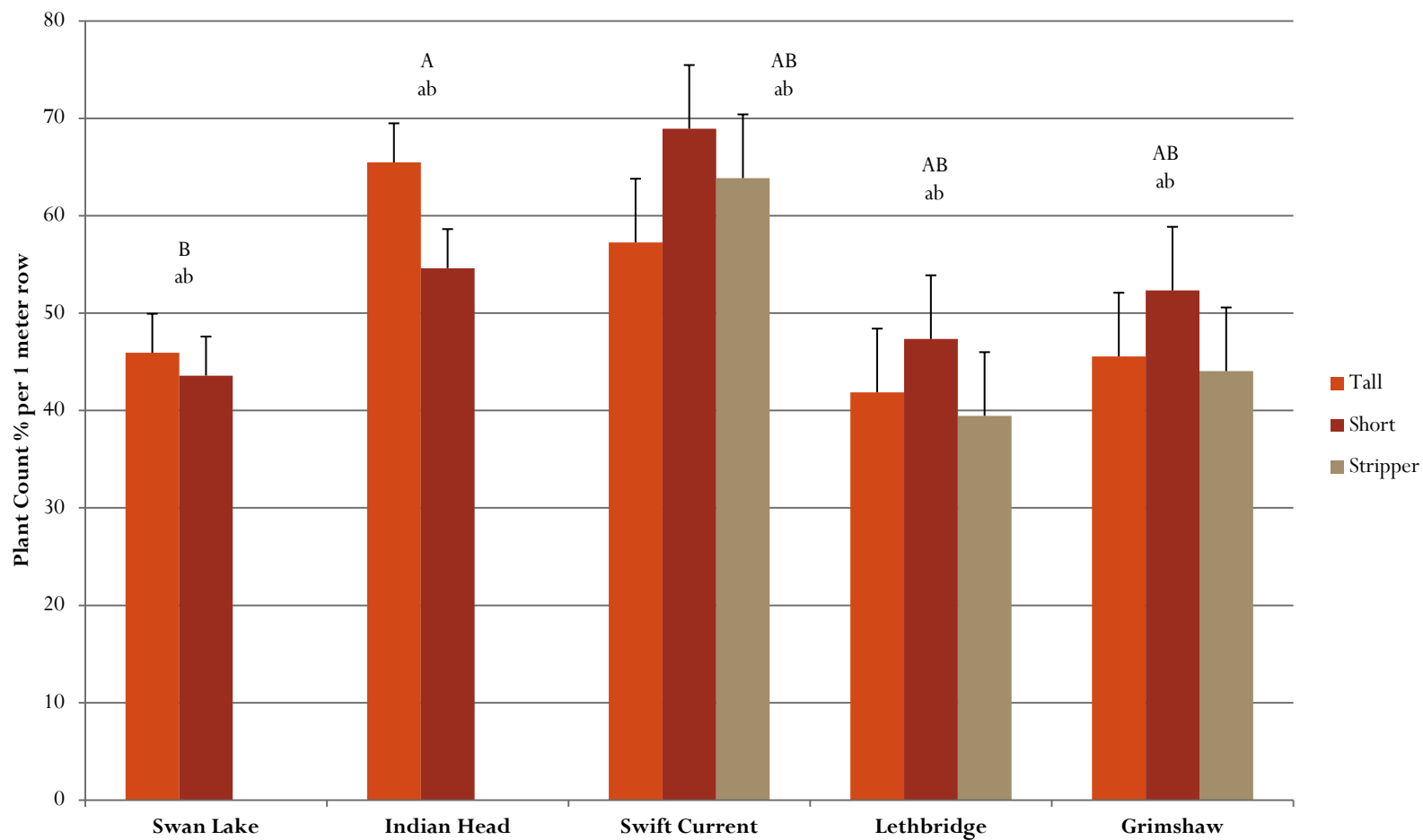
- I-Button's were used to measure hourly temperature .
- Towers were constructed to hold I-Buttons at 50, 20 and 5 cm above the stubble and 5 cm below the soil surface.
- I-buttons mounted in non-conductive wood , facing north and shaded on the south side by white PVC pipe
- Two towers per treatment on either side.



Results- Emergence

- Significant treatment effects on emergence were observed at all 5 sites.
- Intact stubble (Swan Lake and Indian Head) showed higher emergence in tall stubble compared to short stubble.
- Damaged stubble (Swift Current, Lethbridge and Grimshaw) had greater emergence in short stubble versus tall stubble.
- Little difference in emergence between sites.

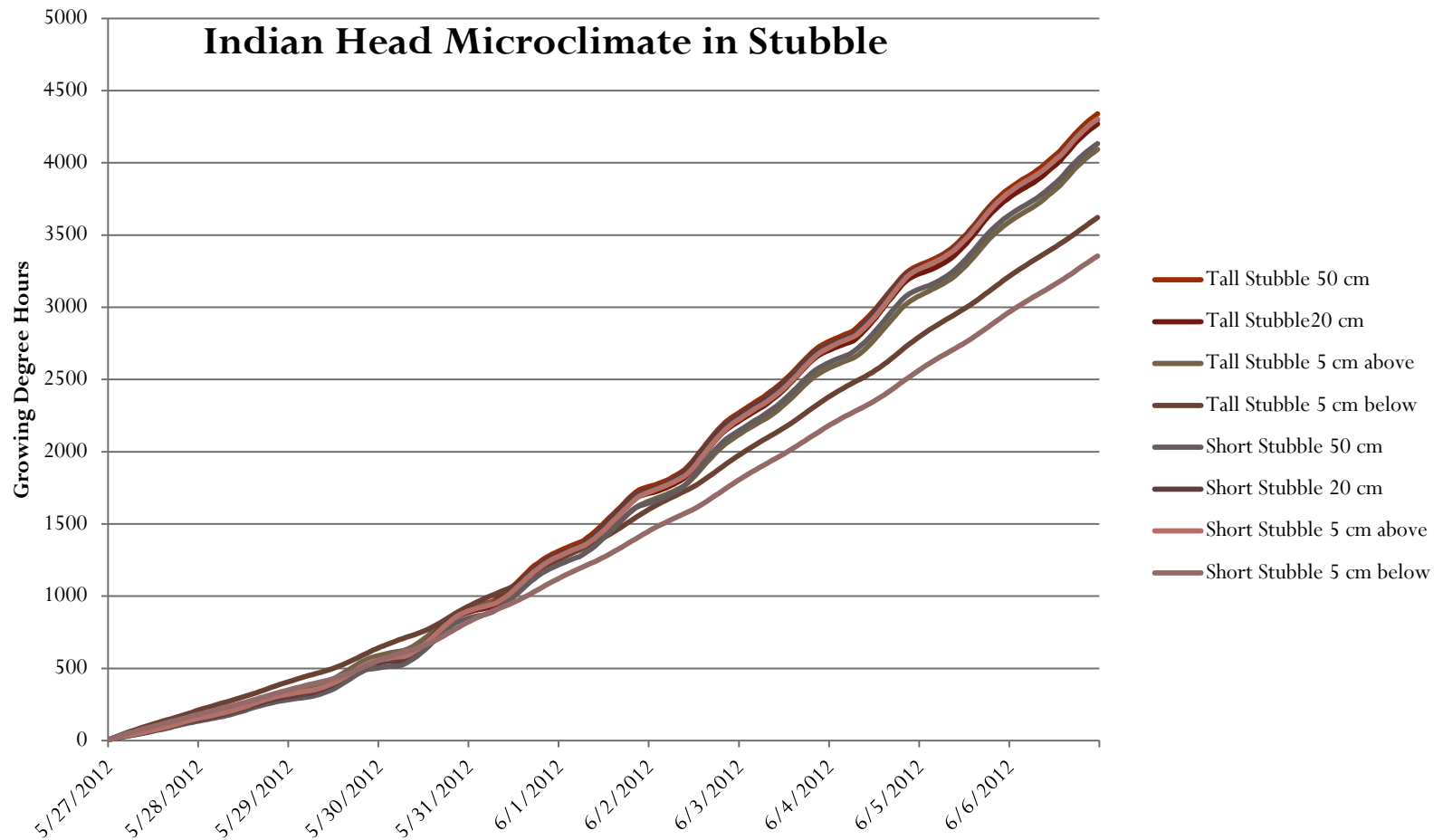
Emergence Results



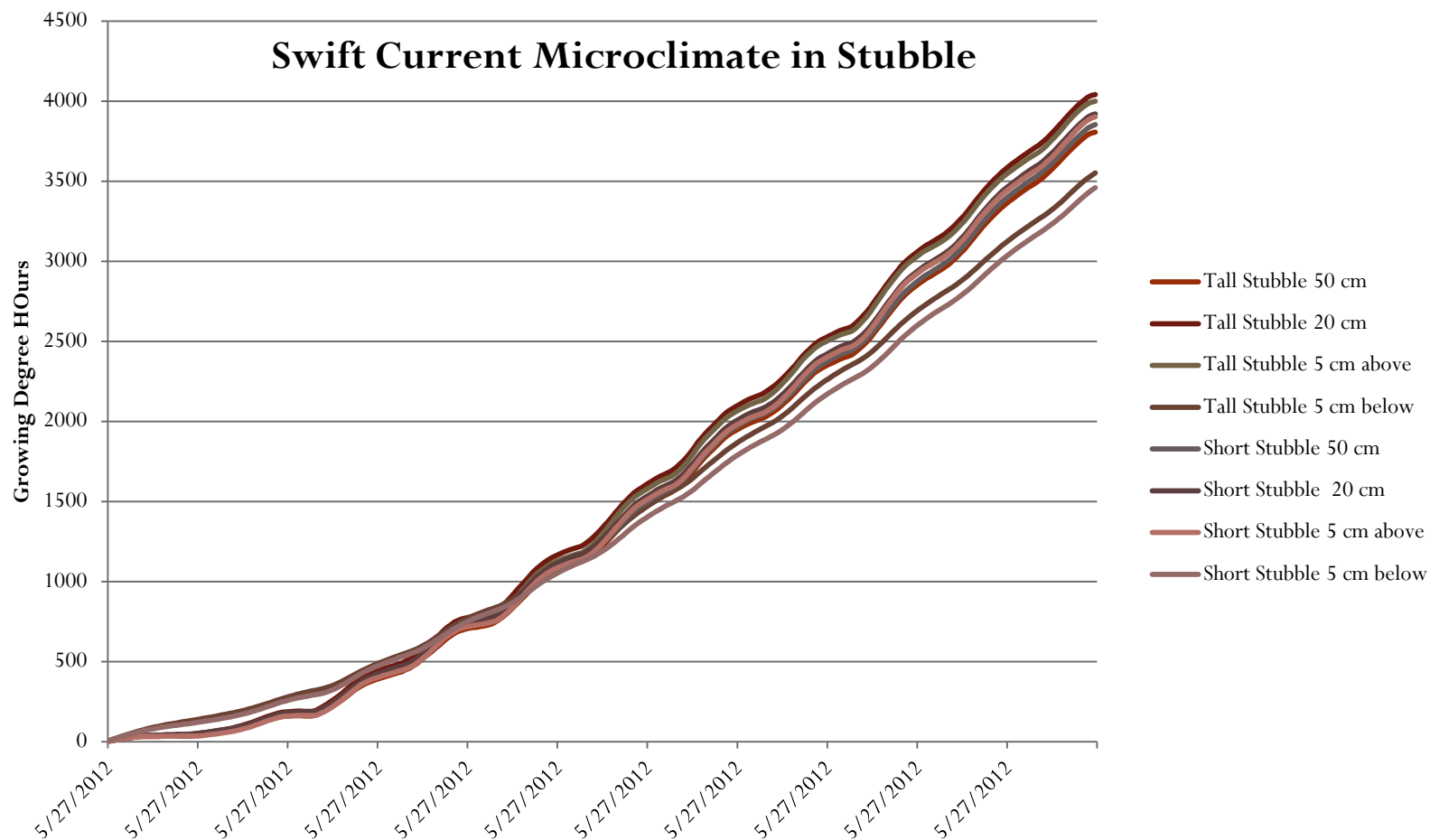
Microclimate Results

- Air temperature at 50, 20 and 5 cm above the soil surface showed little or no difference between tall and short stubble.
- Soil beneath Intact Tall Stubble was warmer than the Short Stubble (possible factor creating higher germination in tall stubble at these sites)
- The damaged stubble may create conditions where emergence is greater in short stubble (less material on surface).

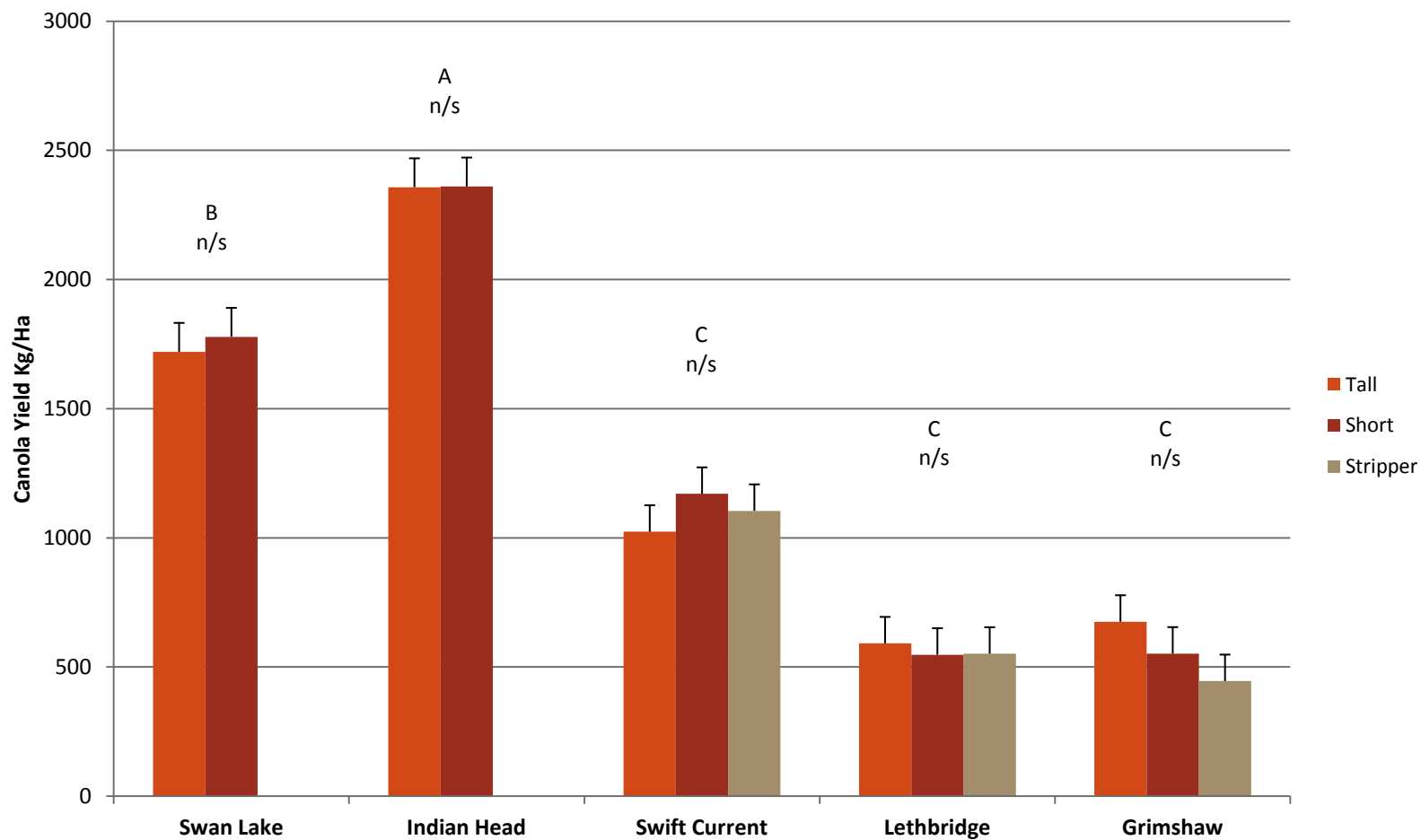
Microclimate Results- Intact Stubble



Microclimate Results- Damaged Stubble



Yield Results



Summary of Results

- There was an increase in tall stubble canola emergence versus short stubble in sites where the stubble remained intact
- Temperature 5 cm below ground surface was warmer in tall than short where the stubble remained intact
- With damaged stubble there was greater emergence in short stubble than tall stubble.
- Despite differences in canola emergence overall biomass and yield were not significantly different in each treatment.
- The sites with the most intact stubble had greater yields overall but this was due to several additional factors (i.e weather).

Acknowledgements

- Canola Council of Canada for Funding
- University of Manitoba
- My Committee Paul Bullock, Aaron Glenn, Rob Gulden
- All summer students, technicians and producers over 2011 and 2012 seasons
- Additional thanks Andrea Cavalieri

